



EncoderAnalyzer

For testing encoders



The EncoderAnalyzer – Complicated applications made easy!

The EncoderAnalyzer is THE tester for checking encoders at electric motors.

Modern engines are often equipped with rotary encoders. There is a huge variety of encoders, making checking complicated. This is especially valid for electric motor repair and production. This complex check is not possible without special measuring technology.

The EncoderAnalyzer provides valuable services. It facilitates the encoder test well by providing voltage to the rotary encoder and measuring and evaluating the signals. At the end you receive clear GO or NO GO results.


KEY-FACTS

- Encoder analysis without special training!
- Automatic check of all encoder signals
- Checking all signal pulses per revolution
- Determining the pulse quantity per revolution
- Checking all 90°-phase shiftings between the signals per revolution
- Automatic check of all signal voltages per revolution
- Angle fault test per revolution
- Sense of rotation and rotation speed of the encoder
- Evaluation of the three commutator signals
- Angle adjustment of rotary encoders
- Measuring the EMF at all three motor phases to adjust resolvers, encoders, or Hall elements
- Measuring the Back-EMF in the motor slowing down and calculate the ke-value for 1000 RPM
- Measuring the EMF symmetry during slowing down
- Measuring device with 6 or 12 high-speed measuring channels
- Integrated, adjustable voltage supply for the encoders
- Integrated reference signal source for resolvers
- Windows®-software for evaluating the measuring signals
- Display of all measuring channels, similar to an oscilloscope
- SQL-database for different encoder models, arranged according to manufacturer and type
- Multilingual, modern operator interface
- Worldwide voltage supply 110-250 V/47-63 Hz



- > Encoder analysis without special training!
- > Automatic check of all encoder signals
- > 6 or 12 high-speed measuring channels

**ROBUST
INDUSTRIAL
STANDARD**

 Made in Germany



The following rotary encoders and sensor systems can be checked by the EncoderAnalyzer:

- Rectangular incremental signal encoder with A, /A, B, /B, N, /N
- Hall-elements with A, /A, B, /B, N, /N
- Commutation transmitter U, /U, V, /V, W, /W
- Hall-elements with U, /U, V, /V, W, /W
- Sine-cosine-encoder with sin, /sin, cos, /cos, N, /N
- Single turn and multi-turn absolute value encoder with SSI- and Hiperface interface
- Resolvers

> Explanations:
N= zero pulse (reference pulse)
/A= inverted signal of A

The functional principle – incredibly simple

The EncoderAnalyzer consists of two components: The measuring module and the analysis software that is installed on a PC.

The measuring module performs the measurements. It measures millions of values during one revolution of the rotary encoder and transfers them to the PC. The communication between measuring module and PC is done via a Gigabit-Ethernet connection. The values are automatically analyzed via the analysis software. At the end of the analysis, the software shows the result on the screen. For better understanding, the faults of the defective rotary encoder can also be displayed in a chart like at an oscilloscope.

The test results are stored in a modern MS-SQL-database. A detailed test report can be printed if required.

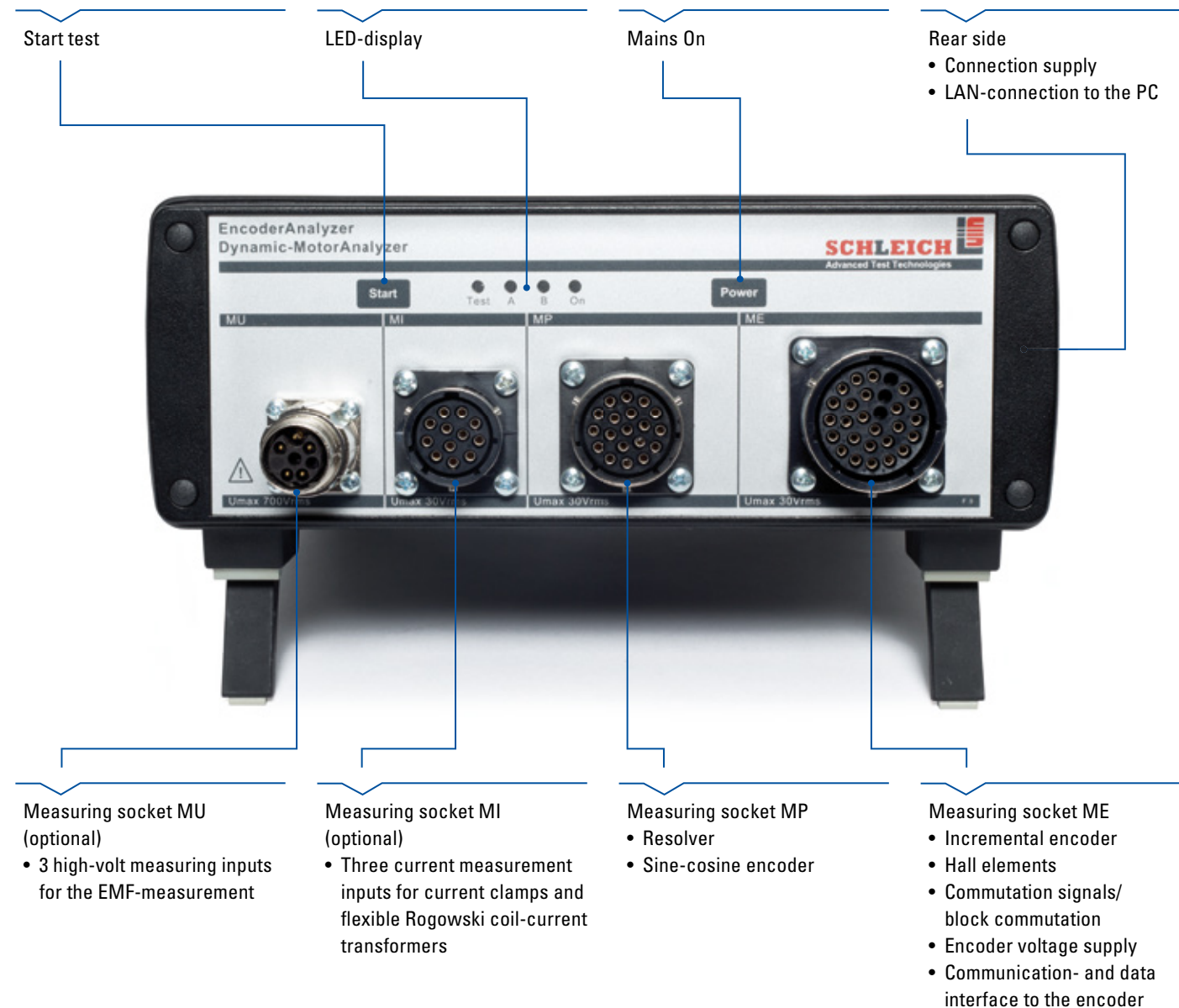
The rotary encoder to be tested is connected to the measuring module via a measuring lead. For connecting various measuring leads there are up to two measuring sockets available at the module's front. The quantity of measuring sockets depends on the ordered options. The EncoderAnalyzer with all 12 measuring channels features 2 measuring sockets.

A voltage supply of 3-30 V for the encoder is also integrated into the EncoderAnalyzer. The operator sets the voltage level and the maximum allowed current consumption of the rotary encoder type in the software. During the test, the EncoderAnalyzer measures the current consumption. If the preset maximum values are exceeded, the voltage supply switches off immediately.



The EncoderAnalyzer needs to have a rotating shaft in order to be able to test rotary encoders. This might be performed directly via the driving motor that is attached to the rotary encoder.

If the rotary encoder is to be checked separately, without driving motor, it has to be run with a constant speed. For this, a cordless drill may be used.



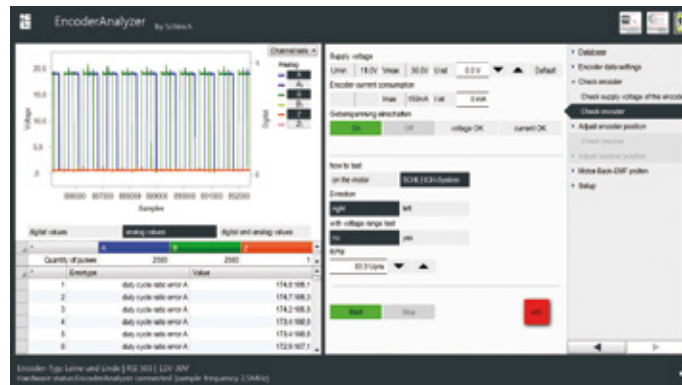
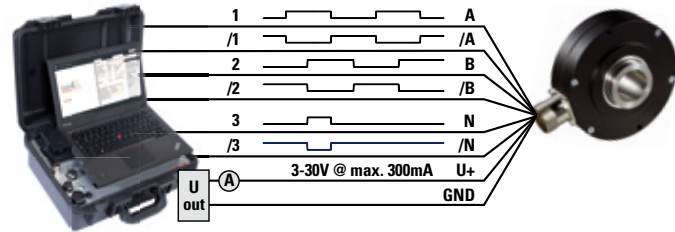
A comfortable solution for the test of an rotary encoder offers our EncoderAnalyzer-test station. The encoder is installed on an exchange adapter, clamped in the test system and a small motor runs the encoder. The test can not only be performed with constant speed, but also test different angle positions. The analysis software directly controls the motor via an interface. In this way, the harmonic interaction between motor control and rotary encoder measuring is ideally given.

› The EncoderAnalyzer-test station is optionally available.

Measurement examples

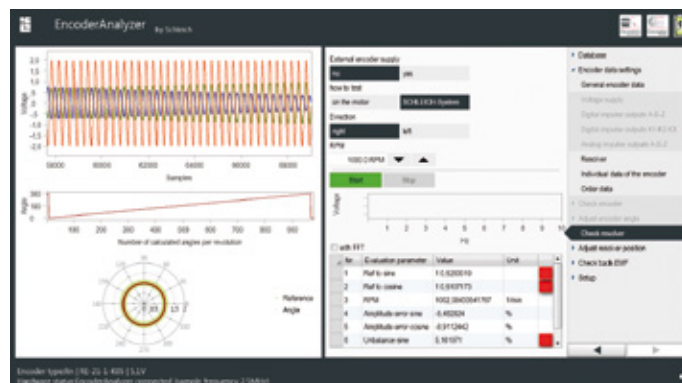
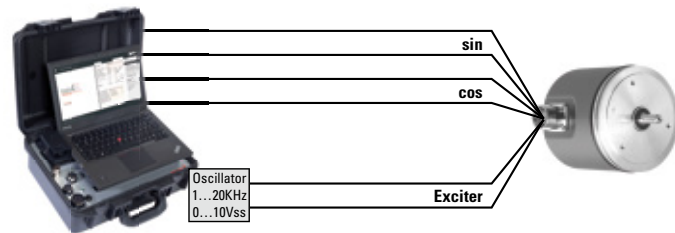
Incremental rotary encoders

The EncoderAnalyzer supplies the rotary encoder with voltage and measures the signals. The signals can come from an optical or also a Hall-element encoder.



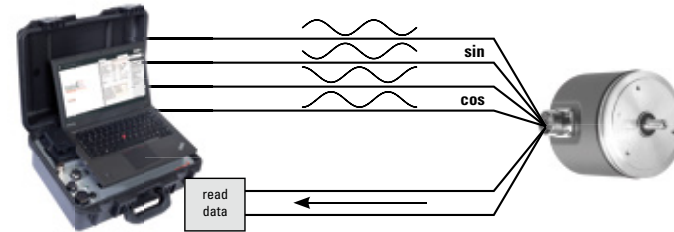
Resolver

The EncoderAnalyzer generates the exciter signal and measures the sin & cos-signal. Based on these three signals, it determines the angle position, angle offset and the accuracy.



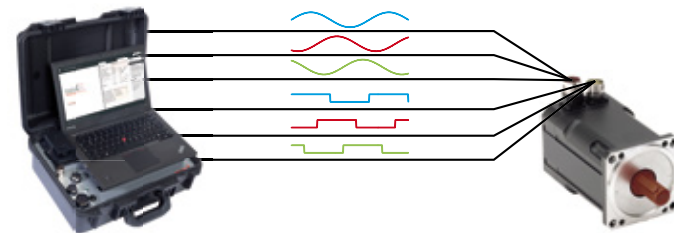
Single- or multturn absolute encoder

The EncoderAnalyzer supplies the rotary encoder with voltage and measures the Sin & Cos-signals. In addition it also scans the absolute position via the data channel. This is done via different interface protocols like Hiperface or SSI.



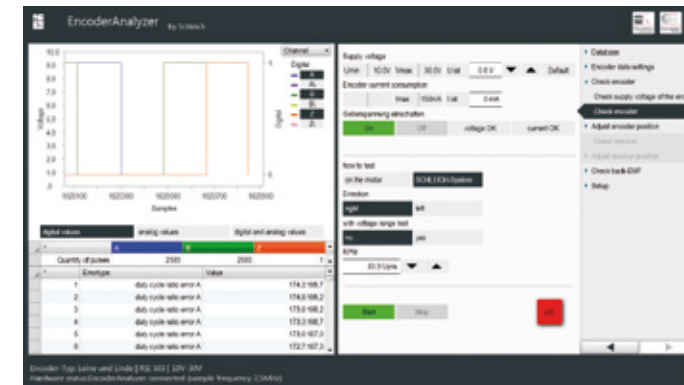
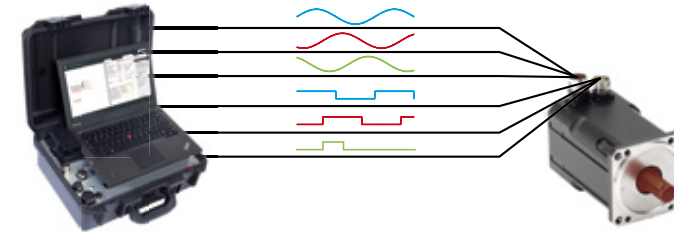
Evaluating the commutation signals

The EncoderAnalyzer supplies the Hall-elements or commutation encoders with voltage and measures the commutation signals. In addition, it measures the EMF-voltage at the winding. This is the precondition for determining the signals' correct phase shifting to the motor voltage.



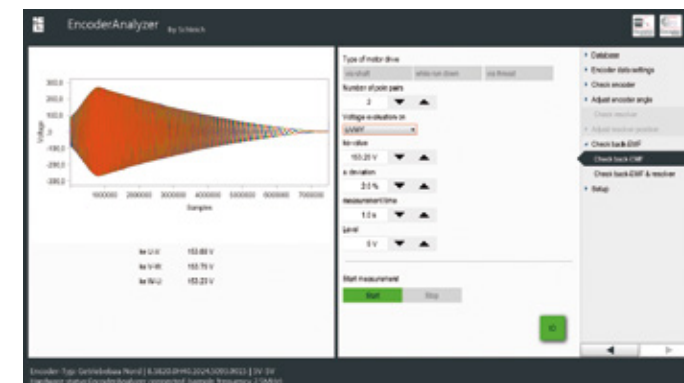
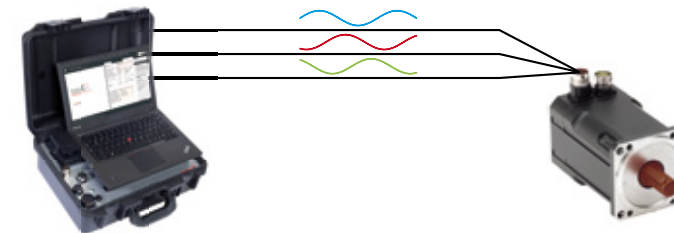
Evaluating the Z-signal

The EncoderAnalyzer supplies the rotary encoder with voltage and measures the angular signals and the Z-signal. The reference pulse Z appears once per rotation. It also measures the Back-EMF-voltage at the winding. This is fundamental to determine the signals' correct angle position in relation to the motor voltage.



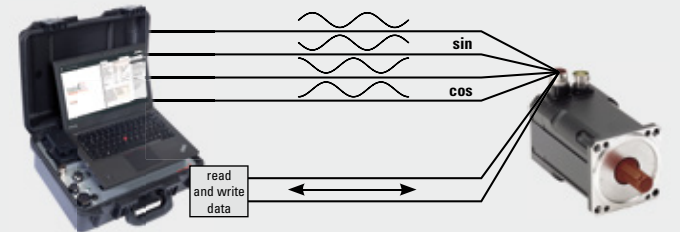
Evaluating the EMF in slowing-down process | ke-value determination

The EncoderAnalyzer measures the generated voltage on a slowing down synchronous machine. The voltage changes during this in amplitude and frequency. It is automatically converted to a voltage value of 1000 Upm by the analysis software. The voltage level at 1000 rpm is an indication of the quality of the magnet or the completed motor.



The angle adjustment

For the exact motor control, the frequency inverter (VFD) requires the rotor's exact angle position. It receives this angle position from the rotary encoder. The rotary encoder needs to measure the rotor's position exactly to the position of the magnetic orientation of the stator field. For this, the rotary encoder has to be assembled and adjusted precisely to the armature's shaft during the assembly. This is mechanically difficult or sometimes not possible with the requested accuracy. Thus a trick is used: the faulty angle position is determined in form of an offset angle and the VFD is informed of this fault position. Either the VFD or special rotary encoders are used as storing locations for the offset angle. For this task, these encoders feature an internal electronic storage to store offset angles (and more). In the later operation, after switching on, the VFD will first download this offset angle from the encoder and correct its control electronics. In doing so, the mechanical assembly fault is electronically corrected.



The EncoderAnalyzer features the possibility to measure and display the angle offset of some motor-encoder combinations. Also the motor's EMF-voltage is often used as reference value.

To measure the motor's voltage, the motor shaft has to be mechanically driven. By this, the motor becomes a generator. Therefore, you have the following 3 possibilities:

1. Run the motor without sensors at nominal speed and switch off the frequency converter, separate the converter's output from the motor by a contactor and measure the EMF, together with the encoder signals.
2. Run the machine with an auxiliary drive and measure the Back-EMF, together with the encoder signals.
3. You run the motor by a pull cord, which is wrapped around the motor shaft and achieve a random speed by pulling the cord. Afterwards, the motor spins out. During this process, the EncoderAnalyzer measures the Back-EMF, together with the encoder signals. This trick can also be used to measure ke-value.

The EncoderAnalyzer determines the fault angle from the measured values. Now, you can easily perform the angular adjustment by hand. Often the motor is supplied with direct current at two phases. By this, the stator magnetically aligns itself and is fixed in this position. Now you can easily adjust the encoder without the risk that the rotor moves. Depending on the encoder type and the EncoderAnalyzer's equipment, also the offset angle may be written in the rotary encoder afterwards.

The analysis software

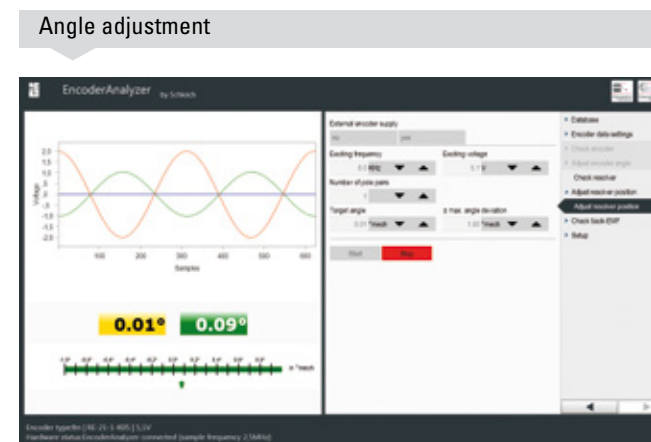
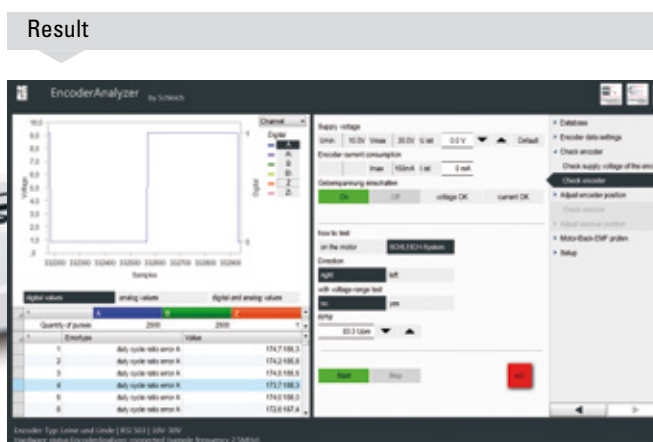
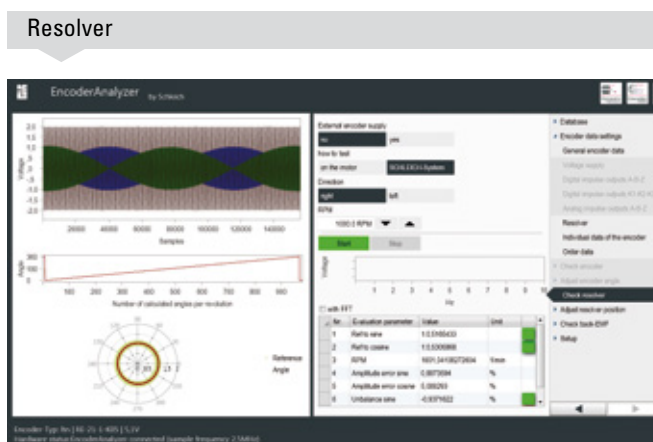
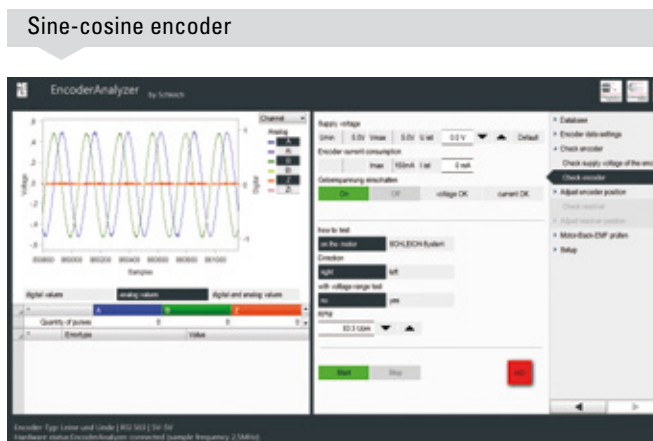
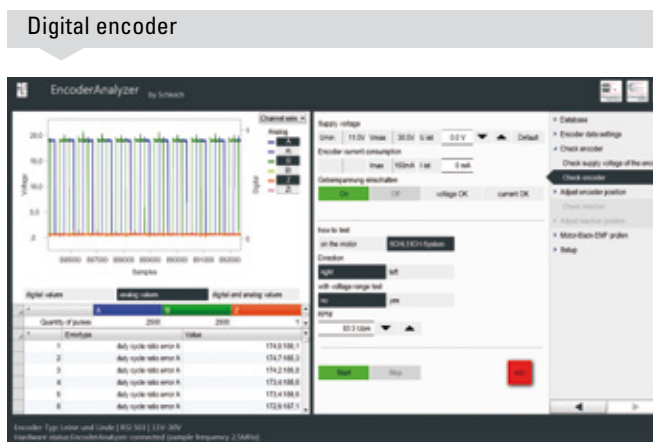
The effective, intelligent measuring technology and the user-friendly, intuitive analysis software are perfectly combined to each other. Only a few setting clicks and selections are required to configure the test for the connected rotary encoder type.

For the connection and evaluation of encoders, the software provides assistance. All inputs in the analysis software are provided with numerous help texts and hints.

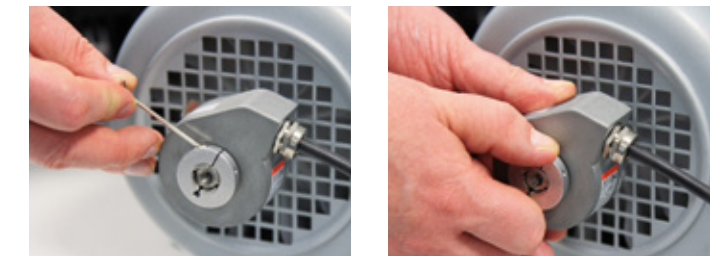
The comprehensive evaluations lead to clear, understandable results. Specialized knowledge is not necessary when using the analysis software.

After entering the test parameters the test is started. The EncoderAnalyzer scans the measured values from at least one encoder rotation. Afterwards the automatic analysis is carried out. The EncoderAnalyzer lists all measured results in a table.

In addition, all faulty signal positions of one complete rotation are indicated in a fault list. By mouse-clicking on the entries in the list, the EncoderAnalyzer indicates you the zoomed signal displays at the fault location, similar to an oscilloscope. By this, you also have visual information about the kind of fault.



In addition, the software also supports the operation regarding the angle adjustment of the rotary encoder. No matter if the rotary encoder has to be adjusted via a mechanical turning or only the angle offset has to be detected, the software graphically supports the operator at the angle adjustment.



Depending on the rotary encoder type and the EncoderAnalyzer's features, the offset angle can also be written in the rotary encoder at the end.

The data base – Everything at a glance

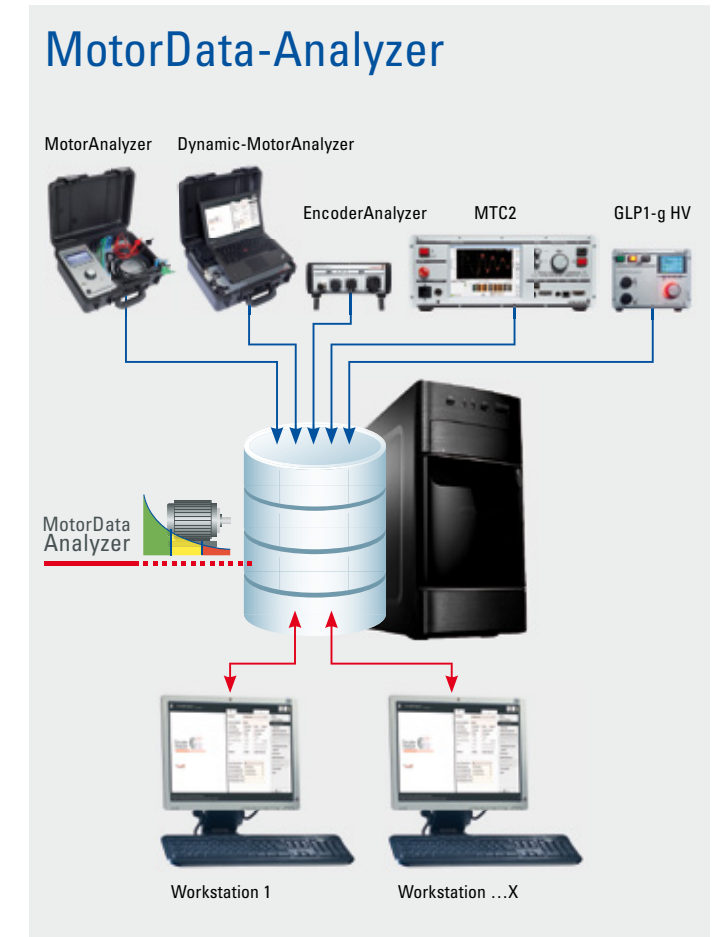
All test results - not only the measured values of the single signals, but also the values calculated from them, are stored in the data base. There are many additional search criteria available, to quickly and efficiently find the encoders in the data base.

If you have further SCHLEICH testers, as e.g. the Dynamic-MotorAnalyzer, MotorAnalyzer 2, the surge voltage tester MTC2 or the high-voltage tester GLP1-g in use, you can store all test results together in one central data base. The centralized data storage and evaluation happens by means of the software "MotorData-Analyzer".

Based on the measured values from all testers, the "MotorData-Analyzer" provides you with detailed information about the electric motor's condition and its attachments.

The "MotorData-Analyzer" is a powerful tool, which allows you to always have an overview of all motors from you or your customer's production. No matter whether e.g. insulation resistances, surge voltage strength, current consumption, load peaks, harmonic content of the mains supply, resolver evaluation and more-all measured values are available at a glance.

The software also reminds you e.g. of the next maintenance tasks and generates various kinds of reports.



The cabinet versions

EncoderAnalyzer desktop device



EncoderAnalyzer desktop device with up to four measuring connections in the tester's front. The connection for the LAN-cable to the PC is located at the tester's rear side. The EncoderAnalyzer is supplied via an external power supply.

	Part no.
EncoderAnalyzer desktop device with 6 x measuring channel	403200
Desktop device extension to 12 x measuring channels	403210
Desktop device extension to 3 x 700 V measuring channels	403212

EncoderAnalyzer in measuring case with integrated laptop



EncoderAnalyzer in a measuring case with four measuring connections and integrated laptop. The high-quality laptop-operating with Windows® – is connected to the EncoderAnalyzer via a docking station. Owing to this station, the high-quality laptop can be taken off the case and used for other tasks. The case can be locked to protect its valuable content.

The case's top is equipped with a hold-down. It ensures that the laptop is safely pushed on the docking station when the cover is closed.

Via the integrated mains socket the EncoderAnalyzer and the laptop are supplied with mains voltage. A special integrated lithium-ion battery allows you, to test also without mains voltage. By this, you can perform mains-independent measurements on site.

EncoderAnalyzer in measuring case with 12 measuring channels	
Incl. voltage measurement channels	3 x 700 V AC
Dimensions (W x D x H)	415 x 325 x 170 mm/16.3 x 12.8 x 6.7 inch
Voltage range	90-250 V/47-63 Hz
Part no.	403220



The accessory

Software for data interface

HIPERFACE®



Part no.	403211
----------	--------

TeamViewer-software



- Tester's remote-control by SCHLEICH in case of service/ support
- Fast support
- Safe and verified connection

Part no.	40031248
----------	----------

MotorData-Analyzer-Software



Software for central analyzing and storing of all motors, encoders and test results

Part no.	403307
----------	--------

Measuring lead ME | 28-pole



Lead length	2 m/6.6 ft
Part no.	4032300

Measuring lead MP | 19-pole



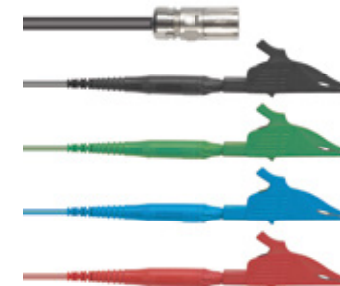
Lead length	2 m/6.6 ft
Part no.	4032200

Measuring lead MP for resolver



Lead length	2 m/6.6 ft
Part no.	4032201

Measuring lead MU with alligator clamps incl. fuses



Lead length	3 m/9.8 ft
integrated fuses	4
Part no.	403291

EncoderAnalyzer-test station



Dimensions (L x H x W)	500 x 220 x 260 mm/19.7 x 8.7 x 10.2 inch
Part no.	403225

> Hiperface and SSI are registered trademarks of the SICK AG

Expect more!

Whatever you want to test, SCHLEICH has the solution! As a leading supplier of electric safety and function test systems as well as motor and winding testers we offer solutions for any task in this sector. Our owner-managed company, founded more than 50 years ago, is present in over 40 markets all around the globe.

Electric motors- and winding testers



Electrical safety- and function testers



SCHLEICH
Advanced Test Technologies

Schleich GmbH
An der Schleuse 11
58675 Hemer | Germany
Phone +49 (0) 23 72-94 98-0
Fax +49 (0) 23 72-94 98-99
info@schleich.com
www.schleich.com

Presented by:



> Expect more.